



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: Poulsen et al.
Serial No.: 09/998,284
Filed: November 30, 2001
For: *Composition*

Examiner: Nashaat T. Nashed
Group Art Unit: 1656

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PRE-APPEAL BRIEF REQUEST FOR REVIEW

Applicants request review of the rejections in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

A petition for a one-month extension of time is submitted herewith.

The review is requested for the following remarks.

Claims 1-3, 9-15, 34, 35 and 40-50 are pending.

Rejection of claims under 35. U.S.C. §102

The Examiner has rejected claims 1, 11-15, 34, 35, 40, 42, 49 and 50 under 35 U.S.C. § 102(b) as being anticipated by EP 0866103 to Hamade et al. ("Hamade"). See Office Action at p. 2. Claims 11-15, 34, 35, 40 and 42 depend from independent claim 1. Claims 49 and 50 are independent claims.

Claim 1 relates to an anti-fouling composition that includes a surface coating material, a first enzyme, a first substrate and a second enzyme. The first substrate is an oligomer or a polymer of a second substrate. The second substrate is a substrate for an oxidative enzyme, and the first enzyme is capable of generating the second substrate from the first substrate. The second enzyme is an oxidase. The second enzyme generates an anti-fouling compound when acting on the second substrate. Claim 49 relates to a method for releasing an anti-fouling compound from a surface coating that includes incorporating in a surface coating a first enzyme, a first substrate and a second enzyme. Claim 50 relates to a method for treating a surface of a vessel that includes applying a coating material to the surface in which the coating material includes a first enzyme, a first substrate and a second enzyme.

The Examiner contends that Hamade teaches “a method preventing fouling surfaces submerged in water by [] which an anti-fouling agent is produced by an enzyme action on its substrate, and anti-fouling composition comprising an enzyme and its substrate” See Office Action at p. 2. The Examiner further contends that Hamade “teach[es] that the substrate of the enzyme that produces the antifouling agent can be generated by the action of another enzyme or enzymes” *Id.* Hamade describes “a coating composition comprising a film-forming resin, an enzyme, and a substrate” See Abstract of Hamade. Hamade describes that the

the compound having antimicrobial activity is produced by enzymatic reaction *between* an enzyme and a substrate. It should be understood that said compound having antimicrobial activity may be a compound obtained as the *direct result of enzymatic reaction between the enzyme and the substrate* or a compound formed from the product of such enzymatic reaction *through further enzymatic or chemical reaction*. The former case in which the compound having antimicrobial activity is the direct product of enzymatic reaction typically includes the case in which said substrate is a precursor of the compound having antimicrobial activity. Typical of the latter case in which the compound having antimicrobial activity is formed from such an enzymatic reaction product through further enzymatic or chemical reaction is the case in which such an enzymatic reaction product is a precursor of the objective compound having antimicrobial activity.

See p. 3, lines 38-46 of Hamade (emphasis added). Contrary to the Examiner's assertion, Hamade does not teach an anti-fouling composition that includes a surface coating material, a first enzyme, a first substrate and a second enzyme. Hamade also does not teach a method for releasing an anti-fouling compound from a surface coating that includes incorporating in a surface coating a first enzyme, a first substrate and a second enzyme. Hamade further does not teach a method for treating a surface of a vessel that includes applying a coating material to the surface wherein the coating material includes a first enzyme, a first substrate and a second enzyme.

Accordingly, claims 1, 49, 50 and claims that depend from claim 1 are not anticipated by Hamade for at least the reasons described above. Applicants respectfully request reconsideration and withdrawal of this rejection.

Rejection under 35 U.S.C. § 103(a)

Hamade in view of Hansen and James

The Examiner has rejected claims 1-3, 9-15, 34, 35 and 38-50 under 35 U.S.C. § 103(a) as being unpatentable over Hamade in view of Hansen et al., J. Biol. Chem., 272(17), p. 11581-7 (1997) (“Hansen”) and James et al., J. Food Biochem., 21, p. 1-52 (1997) (“James”). See Office Action at p. 3. Claims 2-3, 9-15, 34-35, and 40-48 depend from independent claim 1. Claims 49

and 50 are independent claims. Claims 38-39 have been previously cancelled thus rendering this rejection moot with respect to those claims.

Claims 1, 49 and 50 each recite the presence of a first substrate selected from oligomers and polymers of substrates for oxidative enzymes. Claims 1, 49 and 50 each recite that the first enzyme reacts with an oligomer or polymeric first substrate to produce a further second substrate on which a second enzyme included in the coating material (an oxidase enzyme) is active.

Hamade does not provide any motivation to include a second enzyme in an anti-fouling composition or in a surface coating or coating material. Moreover, Hamade does not provide a reasonable expectation of successfully including a second enzyme in a composition or in a surface coating or coating material. Further, the disclosure in Hamade would actually lead the skilled person away from the subject matter at claims 1, 49 and 50 because Hamade teaches that a composition with only one enzyme has an anti-fouling effect. See Example 4 of Hamade.

Hamade suggests that this problem is solved merely by dispersing the enzyme and the substrate in a matrix. See page 6, lines 3-12 of Hamade. In particular, Hamade states “[i]n the present invention, the penetration of water into the matrix occurs gradually and sustainedly so that the compound having antimicrobial activity is produced persistently at a controlled rate” See page 6, lines 10-12 of Hamade. Hamade continues by stating that the problem of controlled release can be easily solved through the use of a coating composition that “comprises a film-forming resin, an enzyme, and a substrate, said enzyme being capable of reacting with said substrate to produce a compound having antimicrobial activity.” (emphasis added). See page 6, lines 25-30 of Hamade. Thus, Hamade’s disclosure teaches away from the present invention as it suggests that a composition comprising an enzyme, a substrate and a film-forming resin is sufficient to overcome the problem of controlled release of the antimicrobial agent.

Further, the only disclosure of an enzyme being active on a polymeric species in Hamade relates to the action of a chitosan-decomposing enzyme on chitosan to produce a compound having antimicrobial activity as a direct decomposition product of chitosan. See claim 13 of Hamade. Such a system teaches away from carrying out a second reaction with a second enzyme on the product formed from the reaction of the polymeric species with a first enzyme. Hamade further provides a lengthy list of non-limiting enzyme-substrate combinations which can generate a large number of different microbial agents. See page 3, line 46 to page 5, line 53 of Hamade. No directions or guidance are provided in Hamade that would lead a skilled person to

select any specific type of enzyme combination over any of the others that are mentioned. In particular there is no suggestion or motivation to use an oxidase enzyme with a substrate that is generated by the action of a first enzyme on a first substrate. There is no suggestion or motivation in Hamade to modify the teachings of Hamade to produce an anti-fouling composition that includes a surface coating material, a first enzyme, a first substrate and a second enzyme. Hamade also does not teach or suggest a method for releasing an anti-fouling compound from a surface coating that includes incorporating in a surface coating a first enzyme, a first substrate and a second enzyme. Hamade further does not teach or suggest a method for treating a surface of a vessel that includes applying a coating material to the surface wherein the coating material includes a first enzyme, a first substrate and a second enzyme.

Hansen and James do not remedy this defect either. Hansen describes the "purification and molecular cloning of hexose oxidase from *C. crispus*, and ... the cDNA sequence of the enzyme." See p. 11581 of Hansen. James describes glucoamylases, "methods used to assay glucoamylase activity," "structural analysis of glucoamylase and main amino acids involved in catalysis and starch binding" and "the use of glucoamylase in the industry." See Abstract of James. Both Hansen and James do not teach or suggest an anti-fouling composition that includes a surface coating material, a first enzyme, a first substrate and a second enzyme. Hansen and James also do not teach or suggest a method for releasing an anti-fouling compound from a surface coating that includes incorporating in a surface coating a first enzyme, a first substrate and a second enzyme. Hansen and James further do not teach or suggest a method for treating a surface of a vessel that includes applying a coating material to the surface wherein the coating material includes a first enzyme, a first substrate and a second enzyme.

Accordingly, claims 1, 49, 50 and claims that depend from claim 1, are patentable over the combination of Hamade, Hansen and James for at least the reasons described above. Applicants respectfully request reconsideration and withdrawal of this rejection.

Hamade in view of Stougaard and James

The Examiner has rejected claims 1-3, 9-15, 34, 35 and 38-50 under 35 U.S.C. § 103(a) as being unpatentable over Hamade in view of U.S. Patent No. 6,251,626 to Stougaard ("Stougaard") and James. See Office Action at p. 3. Claims 2-3, 9-15, 34-35, and 40-48 depend from independent claim 1. Claims 49 and 50 are independent claims. Claims 38-39 have been previously cancelled thus rendering this rejection moot with respect to those claims.

As described above, Hamade and James do not teach or suggest an anti-fouling composition that includes a surface coating material, a first enzyme, a first substrate and a second enzyme. Hamade and James also do not teach or suggest a method for releasing an anti-fouling compound from a surface coating that includes incorporating in a surface coating a first enzyme, a first substrate and a second enzyme. Hamade and James further do not teach or suggest a method for treating a surface of a vessel that includes applying a coating material to the surface in which the coating material includes a first enzyme, a first substrate and a second enzyme.

This defect is not remedied in Stougaard. Stougaard describes "[a] method of producing hexose oxidase by recombinant DNA technology, recombinant hexose oxidase and the use of such enzyme, in particular in the manufacturing of food products such as doughs and dairy products, animal feed, pharmaceuticals, cosmetics, dental care products and in the manufacturing of lactones." See Abstract. Stougaard does not teach or suggest an anti-fouling composition that includes a second enzyme. Stougaard also does not teach or suggest a method for releasing an anti-fouling compound from a surface coating that includes incorporating in a surface coating a first enzyme, a first substrate and a second enzyme. Stougaard further does not teach or suggest a method for treating a surface of a vessel that includes applying a coating material to the surface wherein the coating material includes a first enzyme, a first substrate and a second enzyme.

Accordingly, claims 1, 49 and 50 and claims that depend therefrom are patentable over the combination of Hamade, Stougaard and James. Applicants respectfully request reconsideration and the withdrawal of the rejection.

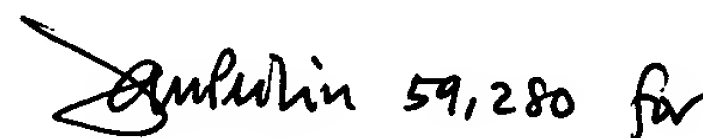
CONCLUSION

In light of the foregoing remarks, Applicant respectfully contends that all conditions of patentability are met. Allowance of the claims is therefore respectfully solicited. The Director is authorized to charge any fees required by the present Request to Deposit Account 19-4293.

Respectfully submitted,

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